Chapter 6
Plans and Specifications

6-1. Schedule

a. Start and completion dates. The contractor is required to commence work under a contract within a specified number of calendar days after the date the contractor receives the notice to proceed. Typically, a period of 10 calendar days is specified. The contractor is directed to prosecute the work diligently and complete the entire work ready for use not later than a specified number of calendar days after receipt of the notice to proceed. The time stated for completion also includes final cleanup of the premises. The time of completion for the work is directly dependent on the scope and extent of the project and can vary from as short as 60 to 90 days up to a number of years for large-scale projects. For example, the Atlantic Coast of Maryland Shoreline Protection Project, which included the placement of about 2.7 million m^3 (3.5 million yd^3) of beach fill and dune construction along about 8 miles of shoreline, required completion within 720 days following the receipt of the notice to proceed (Anders and Hanson 1990). For some projects, the start and completion dates may be dictated by environmental considerations such as dredging windows or recreational seasons. Sufficient completion time should be provided in order to avoid excessively high bid proposals from contractors. To enforce the specified completion time for a project, liquidated damages are generally required for each day of delay.

b. Start and completion dates for specific sub-tasks. Interim start and completion dates may be required for specific subtasks, depending on the scope of the project. For example, an interim completion date for beach fill placement between designated stations may be required to enable other project features such as revetment or bulkhead construction to proceed.

(1) Depending on the scope of the project, the contractor may be required to develop a network analysis system for scheduling the work. In preparing this system, the scheduling of construction is the responsibility of the contractor. The requirement for the system is included to assure adequate planning and execution of the work and to assist the Contracting Officer in appraising the reasonableness of the proposed schedule and evaluating progress of the work. An example of one of the numerous acceptable types of network analysis systems is shown in Corps of Engineers Pamphlet 415-1-4.

(2) The system should consist of diagrams and accompanying mathematical analyses. Diagrams should show the order and interdependence of activities and the sequence in which the work is to be accomplished as planned by the contractor. The basic concept of a network analysis diagram is followed to show how the start of a given activity is dependent on the completion of preceding activities and how completion of one activity restricts the start of following activities.

(3) A preliminary network defining the contractor's planned operations during the first 60 calendar days after notice to proceed should be submitted soon after the notice to proceed. The contractor's general approach for the balance of the project should be indicated. The complete network analysis system consisting of the detailed network mathematical analysis, schedule of anticipated earnings as of the last day of each month, and network diagrams should be submitted within a specified number of calendar days after receipt of notice to proceed. The approved schedule should then be used by the contractor for planning, organizing, and directing the work, reporting progress, and requesting payment for work accomplished.

c. Expenditures. The contractor should submit a monthly report of the actual construction progress. The report should show the activities or portions of activities completed during the reporting period and their total value as basis for the contractor's periodic request for payment. Payment made should be based on the total value of such activities completed or partially completed after verification by the Contracting Officer. An updated network analysis should be used as a basis of partial payment. The report should state the percentage of the work actually completed and scheduled as of the report date and the progress along the critical path in terms of days ahead or behind the allowable dates. If the project is behind schedule, progress along other paths with negative slack should also be reported. The contractor should also submit a narrative report which should include but not be limited to a description of the problem areas, current and anticipated, delaying factors and their impact, and an explanation of corrective actions taken or proposed.

6-2. Specifications

a. Boundaries of project area. The limit of the contract area available to the contractor must be shown on the project drawings. Except where indicated, the contractor should confine his work to the area seaward of the construction baseline and between the lateral limits of the contract. This area does not generally include access, storage, and staging areas. Access routes and storage and staging areas required to perform the work should be provided by, and at the expense of, the local sponsor. Sponsors are generally given credit for the cost of obtaining

the necessary easements and rights-of-way toward their share of project costs. The contractor should coordinate access to the work area and storage and staging area locations with the Contracting Officer. Unless otherwise approved by the Contracting Officer, excess equipment should only be stored in approved storage or staging areas or in temporary areas in the immediate vicinity of the site of the beach fill placement. Operation of grading and other construction equipment should not be permitted outside the work area limits except for ingress and egress to and from the site at approved locations.

b. Boundaries of borrow area. All excavation for beach fill material should be performed within the borrow area limits shown on the project drawings. Excavation in the borrow areas may be restricted to specified elevations depending on the findings of the geotechnical investigations of the borrow site. For offshore sources, the contractor should be required to set appropriate buoys which should meet U.S. Coast Guard standards to delineate the limits of the borrow areas. The contractor should be required to have electronic positioning equipment capable of achieving class 1 survey accuracies as specified by EM 1110-2-1003. These accuracies are necessary to locate the dredge when operating in the borrow area. Continuous location of the dredge should be determined at all times during dredging operations. The location should be determined with a probable range of error not to exceed 15 m (50 ft) to avoid violations of the environmental permits and clearances and furnished as a part of the daily report of operations. Prior to initiation of any dredging, the contractor should submit for approval his proposed method of determining dredge location.

c. Routes between borrow area and project site. The determination of the route and the method of transporting the beach fill material from the borrow area to the fill area should be at the contractor's option. For offshore borrow sources, the contractor should be required to conduct the work in such manner as to obstruct navigation as little as possible. Upon completion of the work, the contractor should promptly remove his plant, including ranges, buoys, piles, and other marks placed by him under the contract in navigable waters or on shore.

(1) If a pipeline dredge is utilized in a congested navigation area, the pipeline may have to be submerged except at the dredge or at the location of any booster pumps or pump-house barges. The contractor should maintain a tight discharge pipeline at all times. The joints of the pipeline should be so constructed as to preclude spillage and leakage. Upon development of a leak, the pipeline should be promptly repaired and the dredge may have to be shut down until a complete repair has been made.

(2) If a submerged pipeline is placed across navigable water, the contractor should notify the Contracting Officer in writing to be received in the District Office prior to the desired closure date. This notification should furnish the following:

(a) Location and depth (over the top of the pipeline) at which the submerged line should be placed.

(b) The desired length of time the navigable water is to be obstructed.

(c) The date and hour placement or removal should commence.

(d) The date and hour of anticipated completion.

It is recommended that a statement concerning submerged pipelines similar to the following be included in the dredging contract:

> Submerged Pipelines. In the event the contractor elects to submerge his pipeline, the top of the submerged pipeline shall be no higher than the required dredging depth for a channel for which the pipeline is placed. The submerged pipeline shall be marked with signs, buoys, and lights as required to the complete satisfaction of the Contracting Officer. (USACE, Wilmington District 1994)

Complying with this requirement may require that the contractor excavate a trench in the channel bottom.

(3) If the contractor elects to use a hopper dredge or pump-out barge, overflow during loading should be permitted to the extent that designated turbidity and water quality standards are met. The contractor should limit the loading to partial loads, if necessary, to meet turbidity and water quality requirements for the overflow during loading. No overflow or spillage should be permitted during transport to the discharge site.

d. Placement methods. The contractor should be given the option of starting the beach fill placement operations at any point and proceeding in any direction along the project beach, unless special conditions exist.

(1) Acceptance reaches which are segments of beach measured along the construction baseline between the designated stations shown on the drawings should be used. For the case of the lateral termini, the acceptance reach is the segment of beach, measured along the construction baseline, between the longitudinal limit of fill and the subsequent designated station.

(2) Once the contractor begins placement in an acceptance reach, placement in that reach should be completed before proceeding to another acceptance reach. Beach fill placement operations should proceed in an orderly manner from reach to reach. If more than one dredge and/or pump-out facility is utilized by the contractor, more than one beach fill operation may be accomplished simultaneously. Placement of beach fill in more than two locations at any one time should only be allowed if adequate inspection is available.

(3) Prior to initiation of beach fill operations, the contractor should submit for approval his proposed plan for beach fill placement. The plan should include the type of dredge plant to be utilized, the location and type of any booster pump facilities to be utilized, and the order of work for beach fill placement. The Contracting Officer should reserve the right to reject any scenario which, in his opinion, may be detrimental to the stability of the in-place beach fill, which may unduly disrupt access to or use of the beach by the public during placement operations, or for any other credible reason. Excavation of sand from the existing beach for use as beach fill should not be permitted.

(4) All materials excavated from the borrow areas should be transported to and deposited in the nearshore and on the beach or dune area within the lines (see paragraph 4-4.g), grades, and cross sections in a controlled manner so as to maximize sand retention within the beach fill section and minimize losses to the ocean. This should be accomplished in a manner acceptable to the Contracting Officer and may include, but not be limited to, temporary diking where required, control of the discharge pipe direction and velocity of discharge, and the control of the sand and water mixture. Temporary diking included within the dune cross section may be left in place and incorporated into the dune structure.

(5) For dredged borrow sources, fill placement on the beach can be accomplished by a single or double-pipe system. The double-pipe system consists of a yoke attached to the discharge line and, by use of a double-value arrangement, the discharge slurry is selectively distributed to either one pipe or the other, or to both pipes simultaneously. The beach is built by placing the first discharge pipe at the desired final fill elevation and pumping until the desired elevation is reached. By alternating between the two discharge lines, beach width is built to the full cross section as the discharge lines advance. Final placement to the design lines and grades can be accomplished using bulldozers.

(6) The contractor should be required to maintain and protect the beach fill in a satisfactory condition at all times until acceptance of the work. Prior to placement of beach fill, the contractor should remove from the work site all snags, driftwood, and similar foreign debris lying within the limits of the beach fill section.

(7) Excavated material should be placed and brought to rest on the beach to the lines, grades, and cross sections indicated on the drawings, unless otherwise directed by the Contracting Officer. Beach topography is subject to changes, and elevations on the beach at the time the work is accomplished may vary from the design elevations. Resulting beach fill quantities may also vary from those shown in the Unit Price Schedule. To accommodate this situation, the contracting Officer should reserve the right to vary the beach fill cross sections at any location along the beach.

(8) The contractor should be responsible for any damage caused by excessive water flowing landward of the beach fill section. Where a pipeline is placed along the beach, sand should be placed around the pipe to form a pedestrian ramp over the pipe at street ends and at mid blocks or at locations otherwise directed by the Contracting Officer. All such ramps should be maintained as long as the pipe is in place.

e. Final project dimensions. The intent of the contract is to place beach fill to the lines and grades prescribed in the contract. Tolerances should be provided in the template for the practicality of construction. Landward of the surf zone, a tolerance 0.2 m (0.5 ft) above or below the beach fill template and measured vertically from the finished grade line is usually permitted. The contractor should be required, however, to provide his best efforts in placing material to the designated lines and grades landward of the influence of waves. It should be considered that the primary goal of nourishment is to place a specified volume of material per foot of beach. The required dimensions of the construction template, particularly the width of the construction berm, should not be explicitly specified so that the width of the berm can be adjusted during construction to account for actual foreshore slope the fill acquires during placement.

(1) Any material placed above the prescribed cross section, plus the allowable tolerance, should not be included in the pay quantities. However, such material may be left in place at the discretion of the Contracting Officer. Continual placement of material to the plus tolerance should not be permitted. In the event that material placed at any prescribed cross section is below the minus tolerance, the contractor should be required to provide additional sand to the level of the beach fill template.

(2) Upon completion of all filling operations in any

acceptance reach, beach fill should be graded and dressed so as to eliminate any undrained pockets and abrupt mounds or depressions in the beach fill surface as necessary to comply with tolerance requirements specified. All temporary dikes not incorporated into the dune cross section should be completely degraded.

(3) Any material that is deposited elsewhere than in places designated or approved by the Contracting Officer or his authorized representative should not be paid for and the contractor should be required to remove such misplaced material and deposit it where directed, at his expense.

f. Method of calculating fill volume for payment. Available options for calculating fill volumes for payment include tabulation of the fill delivered by truckload from land borrow sources, comparison of pre- and post-dredging surveys for offshore sources, and measurement of in-place volumes after placement. Of these options, the latter is generally recommended. With this method, acceptance reaches should be used for the purpose of closely monitoring the accumulative amounts of beach fill placed. Acceptance reaches should also be used to control the timing for pre-placement and post-placement surveys. The Contracting Officer should not accept payment for a reach until beach fill placement is completed within an acceptance reach and final surveys have been approved. Separate acceptance for the dune portion of the beach fill may be made upon approval of the Contracting Officer. In no case, however, should the contractor be paid more than once for sand placed in any space along any acceptance reach, should erosion occur before the entire volume of sand is placed. Unless otherwise approved by the Contracting Officer, acceptance reach stationing should be as shown on the contract drawings.

(1) Beach fill, satisfactorily placed, may be measured for payment by use of the average end area method. Quantity computations should be verified from survey data submitted by the contractor in accordance with specified procedures. The basis of measurement should be the pre-placement cross sections of the beach and dune area taken by the contractor just prior to placement of fill in any acceptance reach and a second set of cross sections of the same area taken by the contractor as soon as practicable after completion of beach fill placement for any acceptance reach. Once post-placement surveys have been taken in an acceptance reach, no removal of beach fill material should be permitted in that reach unless otherwise directed by the Contracting Officer. Landward of the surf zone limit, the area of fill material lying above the plus tolerance template should be deducted from the gross area and the net amount used as a basis for measurement. Seaward of the surf zone limit, the quantity of fill material used as a basis for measurement should be that determined from the minimum of the area of fill measured between pre- and post-fill cross sections, less any material placed seaward of the intersection of the beach fill template with the existing sand surface. Reasonable constraints with respect to the construction template should be used on the foreshore portion of the profile. Keep in mind that the success of the project should be based on the placement of a required volume of fill per foot of beach.

(2) Payment for beach fill should be made at the contract unit price per cubic meter (cubic yard). Such payment should constitute full compensation for furnishing all labor and performing all work necessary to excavate, transport, and place beach fill material, and all other items of work required by the drawings and the specifications for which separate payment is not provided.

(3) Survey specifications should indicate that the contractor should conduct the original and final surveys and surveys for any period for which progress payments are requested. All these surveys should be conducted under the direction of the Contracting Officer, unless the Contracting Officer waives this requirement in a specific instance. The contractor should employ a registered and licensed land surveyor, experienced in land and hydrographic surveying, to perform the work required for quantity surveys. Prior to initiation of any quantity surveys, the contractor should submit to the Contracting Officer for approval a description of his method and the type of equipment that will be used for making quantity surveys.

(4) The contractor should make such surveys and computations as are necessary to determine the quantities of work performed or sand placed. All original field notes, computations, and other records should be furnished to the Contracting Officer at the site of the work.

(5) The contractor should perform his pre-placement surveys of an acceptance reach no more than 5 days prior to placement of beach fill material. Prior to placement of beach fill material the contractor should submit to the Contracting Officer, all field notes, data disc(s), and computations in a sufficient amount of time so that control of quantities and, if necessary, adjustment to the berm width may be made.

(6) Post-placement surveys should be made as soon as practicable after completion of an acceptance reach. The contractor should use the same stations that were used in the pre-placement surveys. Post-placement surveys for the next reach should not be conducted until the previous reach is accepted by the Contracting Officer.

(7) The contractor should prepare and provide to the Contracting Officer, immediately after completion of an acceptance reach, cross-sectional drawings showing preplacement conditions, postplacement conditions, and the design beach fill template for each section surveyed. Survey cross sections should be taken perpendicular to the construction baseline at specified stations and at the beginning and ending acceptance reach stations. When unusual site or geographical conditions exist, additional stations and elevations should be taken for greater definition. Pre- and postplacement surveys should extend to a distance seaward of the intersection of the beach fill template with the existing sand surface. That distance should be at the discretion of the presiding District. The scale for the plotted cross-section drawing should be on the order of 2.5 cm = 1.5 m (1 in. = 5 ft) vertical and 2.5 cm = 6.1 m (1 in. = 20 ft) horizontal. All stations and elevation points taken from field books should be clearly indicated on the sections.